

PROCEEDINGS  
OF  
THE ROYAL SOCIETY.

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May 21, 1840.

The MARQUIS of NORTHAMPTON, President, in the Chair.

William Burge, Esq., Walter Ewer, Esq., Thomas Tassell Grant, Esq., and Henry Lawson, Esq., were balloted for, and duly elected into the Society.

The following papers were read, viz. :

1. "Remarks on the Meteorological Observations made at Alten, Finmarken, by Mr. S. H. Thomas in the years 1837, 1838, and 1839." By Major Sabine, R.A., V.P.R.S., and Lieut. Col. Sykes, F.R.S.; being a Report from the Committee of Physics, including Meteorology, to the Council, and communicated by the Council to the Royal Society.

These observations, made at Alten in lat.  $69^{\circ} 58' 3''$  N., and  $23^{\circ} 43' 10''$  east of Paris, would seem to have a claim to the attention of the Royal Society, as they offer the *experimentum crucis* of Professor Forbes's empirical formula respecting the gradual diminution of the daily oscillations of the barometer, within certain limit hours, from the equator to the poles. Professor Forbes has laid down an assumed curve, in which the diurnal oscillation amounts to  $\cdot 1190$  at the equator and 0 in lat.  $64^{\circ} 8' N.$ , and *beyond that latitude* the tide should occur *with a contrary sign*, plus becoming minus. Now Alten being nearly in lat.  $70^{\circ}$ , if Professor Forbes's law hold good, the maxima of the diurnal oscillations should occur at the hour for the minima at the equator, and a similar inversion should take place with respect to the minima. Mr. Thomas has himself however modified the value his observations would otherwise have had, by adopting 2 P.M., instead of 3 P.M., for the hour of his observations for the fall; and he has adapted his barometrical observations to a mean temperature of  $50^{\circ}$  Fahr., instead of  $32^{\circ}$ . The first year's observations commence on the 1st October, 1837, and terminate on the 30th September, 1838. The barometer stood 66 feet 5 inches above low-water mark, and the thermometer hung at 6 feet above the ground; but care was not always taken to prevent the sun shining on it. The mean height of the barometer for the year was  $29^{\circ} \cdot 771$ , and the mean of the thermometer almost coincident with the freezing point, viz.,  $32^{\circ} \cdot 017$ . The

maximum height of the barometer was  $30^{\circ}89$  in January, and the minimum  $28^{\circ}71$  in October. The mean of the barometer at 9 A.M. was  $29^{\circ}764$ , therm.  $33^{\circ}455$ ; at 2 P.M.  $29^{\circ}765$ , therm.  $33^{\circ}327$ ; and at 9 P.M.  $29^{\circ}784$ , therm.  $29^{\circ}270$ . The diurnal observations would seem to support Professor Forbes's theory; but the 9 P.M. observations are entirely opposed to it, as they appear with the same maximum sign as at the equator, whereas the sign ought to have been the reverse; indeed, with respect to the diurnal observations, the mean of five months of the year at 9 A.M. gives a plus sign, although the mean of the year at 2 P.M. only gives the trifling quantity of  $\cdot001$  plus. There is one remarkable feature in these observations that cannot fail to strike the meteorologist. M. Arago, from nine years' observations at Paris, reduced to the level of the sea, makes the annual mean height  $29^{\circ}9546$ ; twenty-one years' observations at Madras make it  $29^{\circ}958$ ; and three years' observations at Calcutta, by Mr. James Prinsep, make it  $29^{\circ}764$ ; and Mr. Thomas brings out  $29^{\circ}771$ . That there should be this coincidence between the observations at Calcutta and Alten is curious. Neither Mr. Thomas nor Mr. Prinsep state whether or not their means are reduced to the level of the sea. It is to be suspected they are not.

For the next year, that is to say, from Oct. 1838 to Sept. 1839, both inclusive, Mr. Thomas uses a French barometer and French measurements, with centigrade thermometer attached to the barometer, and Fahrenheit's for the detached thermometer. He changes his time of observation from 9 A.M. to 8 A.M., 2 P.M., and 8 P.M., and he reduces his barometrical observations to 0 centigrade. The results of the year are as follow:—mean annual pressure  $29^{\circ}627$  English; thermometer Fahr.  $33^{\circ}36$ ; greatest pressure in April, least in January!! The mean of 8 A.M. is  $29^{\circ}620$ ; therm.  $33^{\circ}75$ . The mean of 2 P.M. is  $29^{\circ}631$ ; therm.  $34^{\circ}73$ . And at 8 P.M.  $29^{\circ}631$ ; therm.  $30^{\circ}57$ . The diurnal observations assist to support Professor Forbes's theory; but as in the preceding year, the P.M. observation is at fault; and if the hour had been 9 o'clock instead of 8 o'clock, it would probably have been more so than it appears. The low annual mean state of the barometer for the year 1837–38 is even increased in the last year's observations; and as fresh instruments\* appear to have been used, there is ground to believe that the fact is associated with the locality, and it may be desirable not only to record in the Proceedings of the Royal Society the data already supplied, but to recommend to Mr. Thomas more particular inquiry on the subject.

The phænomena of the Aurora Borealis appear to have been observed by Mr. Thomas with great assiduity, and recorded with great care. On examining the register, with reference to M. Erman's important remark, that "in Siberia two kinds of aurora are distinguished, one having its centre in the west, and the other in the east, the latter being the more brilliant," it is found that twenty-two

\* It appears that the barometer was compared before leaving France, and subsequently to its being taken back to that country.

nights occur in the course of the two winters in which the formation of arches of the aurora is noticed and their direction recorded; of these, *ten* are to the *west*, having their centres rather to the southward of west, the arches extending from N.W. to S.S.E. and S.E.; *seven* are to the *east*, or more precisely to the southward of east, the arches extending from N.E. to S.E. and S.W. Of the five others, *four* are said to be from east to west across the zenith, and cannot therefore be classed with either of the preceding, and *one* is noticed generally as being to the north. The facts here recorded appear to afford an evidence of the same nature as those mentioned by M. Erman, as far as regards there being two centres of the phenomenon. In respect to the relative brilliancy of the eastern and western aurora, nothing very decided can be inferred from the register. If, as M. Erman supposes, that they may be referred respectively to "les deux foyers magnétiques de l'hémisphère boréal," it is proper to notice that the position of Alten is nearly midway between those localities.

There can be no doubt that the frequent appearance of the aurora, and the peculiarities of the phenomenon observed there, render it a most desirable quarter for a magnetical and meteorological observatory.

EDWARD SABINE.  
W. H. SYKES.

2. "Second Letter on the Electrolysis of Secondary Compounds, addressed to Michael Faraday, Esq., D.C.L., F.R.S., &c." By J. Frederic Daniell, Esq., For. Sec. R.S., Professor of Chemistry in King's College, London.

The author, in this letter, prosecutes the inquiry he had commenced in the former one, into the mode in which the chemical elements group themselves together to constitute *radicles*, or proximate principles. He considers his experiments as establishing the principle that, considered as electrolytes, the inorganic oxy-acid salts must be regarded as compounds of metals, or of that extraordinary compound of nitrogen and four equivalents of hydrogen to which Berzelius has given the name of *ammonium*, and compound anions, chlorine, iodine, &c., of the Haloide salts; and as showing that this evidence goes far to establish experimentally the hypothesis originally brought forward by Davy, of the general analogy in the constitution of all salts, whether derived from oxy-acids or hydro-acids. Some remarks are made on the subject of nomenclature, and the rest of the paper is occupied with the details of the experiments, all bearing on the important subject which he has undertaken to investigate.

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May 28, 1840.

FRANCIS BAILY, Esq., V.P., in the Chair.

The ballot for the Right Rev. the Lord Bishop of Norwich was deferred until the next meeting of the Society, there not being a sufficient number of Fellows present.